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the treatment of a subject so very important is rather astonishing, and it is the deficiency in this regard that will we fear detract from the general usefulness of the work. The main part of the book contains the descriptions of the individual mineral species, of which some seventy-five are described, and their occurrence and uses commented on. A series of tables for the determination of the minerals, chiefly by means of their physical characters, are included in the descriptive part and is designed to supplement the latter. Part II. furnishes a brief description and classification of the more common rocks.

C. H. W.

Lehrbuch der anorganischen Chemie. Von PROFESSOR DR. H. ERDMANN, in Halle. Zweite Auflage, mit 287 Abbildungen, einer Rechen-tafel und sechs farbigen Tafeln. Braunschweig, Druck und Verlag von Friedrich Vieweg und Sohn. 1900.

To quote from the author's preface. "First of all a text-book of chemistry should give reliable data concerning the properties and reactions of substances; here were gaps to be filled, for our larger manuals generally take without criticism the frequently contradictory statements and figures of different authors. The most accurate data, however, remain lifeless matter for reader and student unless the book explains the occurrence of substances on a geological basis, gives due attention to their therapeutic and toxic properties, and due recognition of their importance for the common weal by a consideration of their varied application, and by statistics of production and price; nor should the historical aspect of the subject be neglected."

Through certain improvements in this edition "somewhat more space could be devoted to those theories which have sprung up on the boundary space between physics and chemistry. Yet their views should never occupy the main place in the presentation of chemistry. He who leads the student into our science by a by-path instead of stimulating him to *pure chemical thought*, does in verity make chemistry a 'science of inferior worth'" (Ostwald).

"As Clemens Winkler aptly says, 'physical chemistry in no sense covers the same field as

inorganic chemistry, for the latter, far from being a closed branch of science, offers countless problems which must be solved by quite other methods than those furnished by the theory of ions.'"

The quotations indicate the character of the book. It is a masterpiece of descriptive chemistry, a book written for riper German university students. If a translation is made it will doubtless be harmfully introduced into our colleges, possibly into high schools. As there is fortunately no translation as yet, the use of the book will be limited to teachers and older students reading German, and to them it will be a benefit and a pleasure.

As introduction, the author in seventy-five pages discusses weight and measure, heat, theories of gases, Avogadro's law, laws of chemical changes, etc. In short, he has brought together what is generally scattered throughout the book. If this were a book for beginners this method would be open to adverse criticism. For older students the reviewer believes it to be the better arrangement, especially when the treatment is as good as here. The author tacitly assumes that the reader is prepared by previous study to follow him without diffuse explanations.

The next division covers the non-metals in 400 pages, the last division the metals in 320 pages. Erdmann divides the non-metals as follows: *Chief gases*, oxygen, hydrogen, nitrogen. *Noble gases*, helium, neon, argon, krypton, xenon. *Air*. *Sulphur group*, sulphur, selenium. *Halogens*, fluorine, chlorine, bromine, iodine. *Phosphorous group*, phosphorous, arsenic, antimony. *Carbon group*, boron, carbon, silicon, germanium.

It is evident from this division that the author does not utilize the periodic system as a means of instruction; indeed he only devotes three pages at the close of the book to the system, his treatment coinciding with that of Ostwald's 'Grundlinien der anorganischen Chemie' in this respect, but in no other. This shelving of the periodic system is to be regretted; it does not accord with the influence which this system exerted and still exerts in the chemical thought and chemical work of the last thirty years and of the present.

At the close of each chapter is a beautifully

illustrated section headed 'Technique and Experiments'; these sections are very pleasing. The apparatus is of the most modern type, many experiments are new.

The author had Professor Ramsay's cooperation in rewriting the chapter on noble gases for this edition. The chapter includes full illustrated descriptions of the methods for obtaining argon and helium, and colored tables of the spectra of all the noble gases, showing the three spectras of argon—the blue, the red and the green. Another interesting chapter is that devoted to flame, illumination, photometry, burners, furnaces, fuel gases, fuels and heat values. In this, as indeed in the whole book, we find the newest methods and the latest statistical results. Striking examples of this are shown in the references to persulphuric acid and to radium; in the first instance the work of Baeyer and Villiger on 'Caro's Reagent' in the *Berichte* of June 7th is utilized for the book which appeared in October; in the latter instance we find in the chapter on barium a brief discussion of radio activity, radium and polonium and of the work of Becquerel, of the Curie's and of Lengyel.

Of more vital importance to the student are the methods of formation of substances and their use in modern technical chemistry, which are not found in any other text-book. For example, recently published books state that hydrochloric acid is obtained technically only as a by-product in the Leblanc process. Erdmann says that while in England one-half million tons of salt are used yearly for Leblanc soda, in other countries this process has only 'historical interest.' Hydrochloric acid, he says, is now made in Germany either as a by-product in the Glauber salt industry from salt and sulphuric acid, or by decomposing magnesium chloride with superheated steam. We find that magnesium chloride is obtained from Strassfurt Carnallite as by-product in crystallizing potassium chloride from Carnallite solution or as a by-product in the manufacture of Glauber salt by action of a solution of Strassfurt Kieserite on salt at low temperatures, 8,000 tons Glauber salt being made yearly by the latter method.

The theoretical side of the book is also well

developed. Physical chemical theories, are, it is true, but little utilized. The author explains the theory of ions briefly under the head of acids, and refers to this and other theories from time to time throughout the book, devoting seven pages at the end to a condensed discussion of the laws of electro-chemistry and of electrolytic dissociation; that is all. But if we examine Erdmann's treatment of any class of compounds in detail we find that more space is given to the theoretical side—as we have hitherto been accustomed to define 'theory'—than by Ostwald, despite the demand of the latter author that a text-book of chemistry shall devote all its space to 'pure chemistry.'

A comparison is justified by the decided stand both authors take. Both volumes are alike in size of page and type, Ostwald having 795 pages and Erdmann 757. The reviewer has chosen at random the oxygen and hydrogen compounds of nitrogen for the purposes of comparison. Ostwald devotes 36 pages to the subject; about one-half of this space is devoted to physical-chemical considerations of great interest; the other half is descriptive chemistry in the narrowest sense, no reference being made to any modern work on structure. Erdmann gives 58 pages, of which 14 are given to illustrated experiment and technique; the remaining 44 pages give fact, theory and statistics; he opens the subject with 5 pages devoted to a study of the constitution of the compounds, relations of the different hydroxyl-acids, etc. Six pages follow on the formation, decomposition and properties of nitric acid, a full but carefully condensed statement. Ostwald gives $1\frac{1}{2}$ pages to nitric acid, namely, composition HNO_3 , saltpeter, Chili saltpeter, decomposition of Chili saltpeter by sulphuric acid in two stages, and a few words on the properties of nitric acid. In short, no more than is contained in an average school chemistry. Erdmann gives $4\frac{1}{2}$ pages to hydrazine and hydrazoic acid; Ostwald, 1 page. Erdmann gives 2 to hyponitrous acid, explaining the stereoisomeric forms, which are ignored by Ostwald in the 15 lines given by him.

In a recent review of Ostwald's book it is said, "Every chemist should own a copy of this book and should conscientiously study it."

The present reviewer subscribes heartily to these words and intends no belittling of this brilliant book, but the fact remains that so much space in it has been required for the applications of physical chemical theory, that much of what we have hitherto considered higher inorganic chemistry has been crowded out, theory as well as fact, and that Erdmann's book supplies those facts and those theories which are lacking in Ostwald's. Every chemist should own and study both books.

EDWARD RENOUF.

NOTES.

Copies of the 'Descriptive Catalogue of Government Publications of the United States from September 5, 1774, to March 4, 1881, compiled, by order of Congress, by B. Perley Poore, Clerk of Printing Records, are now for sale for \$1.90. Remittance should be by money order payable to W. H. Collins, Chief Clerk, Government Printing Office, Washington, D. C.

THE work on the 'Mammals of Egypt,' left unfinished by the recent death of Dr. John Anderson, will be completed under the supervision of Mrs. Anderson.

UNDER the title 'First on the Antarctic Continent' Mr. Borchgrevink, the commander of the recent Antarctic expedition, has now completed the account of his voyage in the *Southern Cross* and of the adventures and incidents in the land near the South Pole. The volume will be published very shortly by George Newnes (Limited).

PROFESSOR WILBUR C. KNIGHT has published a large-sized block-line geological map of Wyoming in Bulletin 45 of the Wyoming Experiment Station, accompanying 'A Preliminary Report on the Artesian Basins of Wyoming.'

D. K. KEILHACK has issued, through the Gebrüder Borntraeger of Berlin, the fourth yearly edition of his *Taschenbuch für Geologen, Paläontologen und Mineralogen*.

SOCIETIES AND ACADEMIES.

GEOLOGICAL SOCIETY OF WASHINGTON.

At the 109th meeting, held at the Cosmos Club, January 23, 1901, the following papers were presented :

Shell Bluff, Georgia, one of Lyell's Original Localities: T. WAYLAND VAUGHAN.

This locality is in Burke county, Georgia, on the Savannah River, about 20 miles in a straight line below Augusta, and about 100 miles above Savannah. It was examined by Sir Charles Lyell during his first visit to the United States and was first brought into prominence by him. Subsequently Conrad visited and studied the bluff, and considering it paleontologically peculiar, gave the name Shell Bluff Group to the beds there exposed, correlating them with the base of the bluff at Vicksburg, Miss., and placing them in the columnar section immediately beneath the Jackson. Later several other geologists, including Loughridge and Professor W. B. Clark, visited the locality. Because of the prolonged discussion as to the precise position of the Shell Bluff section in the Eocene series, Mr. Vaughan visited the locality during December, 1900, and made a considerable collection of fossils. All the face of the bluff, something over 70 feet, except the uppermost 10 feet, contains a fauna identical in essential species with the Lisbon beds of Alabama, the Wautubbee beds of Mississippi, and the Texan and Louisianan Lower Claiborne of Harris and Vaughan. The uppermost layers contain almost exclusively *Ostrea Georgiana* Conrad, no fossils that could be used as positive stratigraphic indices being found, but it is most probable that this portion of the section also belongs to the same horizon. Compared with the section at Claiborne, Alabama, the section of Shell Bluff can be correlated with the Lisbon, the second horizon beneath the Claiborne sands proper, *i. e.*, it is below the *Ostrea settonformis* bed which immediately underlies the Claiborne sands.

A few of the species are : *Turbinalia pharetra* Lea, *Endopachys maclurii* (Lea), *Mesalia obruta* (Conrad), *Venericardia planicosta* Lam., *Venericardia alticostata* (Conrad), *Corbula oniscus* Conrad, *Pteropsis lapidosa* (Conrad). Approximately forty species were collected.

Trias in Northeastern Oregon: WALDEMAR LINDGREN.

As a preliminary, the occurrences of marine Trias in the western part of North America